REMARKS

The present application includes claims 1-22. By this Amendment, claims 1, 11, 21, and 22 have been amended as set forth above. The Applicants respectfully submit that pending claims 1-22 define patentable subject matter.

Claims 1-6, and 11-16 remain rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,622,174 ("Yamazaki"). Claims 8-10, and 18-22 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki in view of United States Patent No. 6,017,309 ("Washburn"). The Applicants respectfully traverse these rejections at least for the reasons set forth previously during prosecution and the following:

I.   Claims 1-6 And 11-16 Are Not Anticipated By Yamazaki

The Applicants first turn to the rejection of claims 1-6, and 11-16 as being anticipated by Yamazaki. "'A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.'" *See* Manual of Patent Examining Procedure (MPEP) at 2131 (internal citation omitted). Further, "'[t]he identical invention must be shown in as complete detail as it is contained... in the claim.'" *See id.* (internal citation omitted). As discussed below, Yamazaki does not expressly or inherently describe "every element as set forth" in the claims of the present application.

Yamazaki discloses an "ultrasonic diagnosis apparatus" that includes "an element for calculating movement velocities every sampling volume on the basis of the ultrasonic echo signals," and an "element for displaying in color the movement velocities." *See*

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Yamazaki at Abstract. Yamazaki, however, describes a non-adaptive system and method

displaying movement velocities in color.

For example, Yamazaki discloses an embodiment in which velocity changes are

shown through variable shading of one or two colors:

> For the category (i), there are two ways: (i-a) one way uses the same color, but brightness changes according to the magnitude of velocity, (i-b) the other way uses changed colors according to the magnitude.

> For the category (ii) of display, the direction is displayed by changed colors and the magnitude by changed brightness. With respect to display of the direction, applicable display ways are restricted according to conditions of velocities calculated. **The color processing circuit 24b of this embodiment will determine color as shown in FIG. 7.** That is, while the contraction of a cardiac muscle is colored as red and the expansion as blue, increased velocities are assigned to brighter red or blue (i.e. increased brightness). In conventionally used color Doppler image, a blood flow going toward the ultrasonic beams is displayed as red and a blood flow going away from the beams as blue.

Id. at column 11, lines 17-32 (emphasis added). That is, Yamazaki describes a fixed

mapping of color hues.

Notably, Yamazaki discloses a system and method in which movement of the

cardiac muscle is shown **only** in red or blue, with increased velocities "assigned to

brighter red or blue." Further, "contraction of a cardiac muscle is colored as red and the

expansion as blue." *See also id.* at column 27, lines 23-27 ("This embodiment is such

that the curves in systole periods represent changes in area of red or red-related color

within the ROI; those in diastole periods represent changes in area of blue or blue-related

color within the ROI."). Thus, in Yamazaki, velocity calculations are assigned colors,

but are not used to determine color representations for those velocities. Yamazaki

clearly articulates this notion of fixedly assigning red or blue to particular velocities at

column 37, lines 9-12:

> In the color processing circuit 24b, for example, red or re-
> related color is given to positive contraction velocity
> (contraction) and blue or blue-related color to negative
> contraction velocity (expansion), and brightness is changed
> according to its magnitude.

Yamazaki assigns only red to a particular type of velocity (e.g., positive contraction

velocity), and only blue to another velocity (e.g., negative contraction velocity), and

merely varies brightness of those two colors to denote increased velocities. The color

scheme is fixed in that contraction is colored as red and expansion as blue, with

increased velocities denoted by varying brightness. *See id., e.g.,* at column 11, lines 59-

64 ("The cross-sectional image consists of a B-mode tomographic image (black-white

gradation) of a heart and a color velocity image (2-D) of the cardiac muscle of the heart

colored, **which is determined according to a color table shown in FIG. 7....**"), *and*

column 29, lines 51-56 ("The stored data in the unit 150 will then be sent to the DSC 156

having a DSC circuit 151 for converting scan systems and a color processing circuit 152

having a **lookup table to color velocity data**. As a result, the converted and colored

velocity data are outputted from the DSC 156 to the image data synthesizer."). As

shown in Figure 7 of Yamazaki, the color table clearly shows that contraction is always

assigned red, while expansion is always assigned blue. There are no other possibilities.

Nor does Yamazaki generate the color characteristic signals based on the detected

velocities. Instead, as shown in Figure 7, the colors are pre-assigned based on

contraction or expansion.

Yamazaki, however, does not "generate... a mapping algorithm to generate a set

of color characteristic signals representative of said values of said movement parameter,"

as recited in claim 1, nor "generating a set of color characteristic signals representative of

said values of said movement parameter in response to a distribution of said set of

parameter signals and a mapping algorithm," as recited in claim 11. Instead, Yamazaki

assigns fixed colors, either red or blue, which correspond to positive and negative

contraction velocities.

The Office Action states the following:

> The Examiner suggests that the applicant focus more on
> how the adaptive algorithm works, as this is most likely
> where the allowable material lies.

See March 21, 2006 Office Action at page 6. The Applicants thank the Examiner for this

guidance and willingness to work with the Applicants towards an allowance.

Accordingly, claim 1 has been amended to recite "wherein the mapping algorithm

comprises a mapping function formed by generating a cumulative total of a frequency of

occurrence of said values of the movement parameter, and normalizing the cumulative

total to a color map." Similarly, claim 11 has been amended to recite "wherein the

mapping algorithm comprises generating a cumulative total of a frequency of occurrence

of said values of the movement parameter, and normalizing the cumulative total to a color

map."

The Applicants respectfully submit that Yamazaki does not disclose each and

every limitation of the pending claims. In particular, Yamazaki does not describe, teach

or suggest a "processor responsive to... a distribution of said set of parameter signals and

a mapping algorithm **to generate a set of color characteristic signals** representative of

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said values of said movement parameter," as recited in claim 1, nor "generating a set of color characteristic signals representative of said values of said movement parameter **in response to a distribution of said set of parameter signals and a mapping algorithm,**" as recited in claim 11. Furthermore, Yamazaki does not describe, teach, or suggest "wherein the mapping algorithm comprises a mapping function formed by generating a cumulative total of a frequency of occurrence of said values of the movement parameter, and normalizing the cumulative total to a color map." Similarly, claim 11 has been amended to recite "wherein the mapping algorithm comprises generating a cumulative total of a frequency of occurrence of said values of the movement parameter, and normalizing the cumulative total to a color map." Thus, at least for these reasons, the Applicants respectfully submit that Yamazaki does not anticipate claims 1-6, and 11-16 of the present application.

II. Claims 8-10 And 18-20 Are Not Rendered Unpatentable By Yamazaki And Washburn

The Applicants next turn to the rejection of claims 8-10, and 18-20 as being unpatentable over Yamazaki in view of Washburn. The Applicants note that the background section of the present application discusses the drawbacks of Washburn. At least for the reasons discussed above, the Applicants respectfully submit that the combination of Yamazaki and Washburn does not render claims 8-10, and 18-20 unpatentable.

III. The Proposed Combination Of Yamazaki And Washburn Does Not Teach Or Suggest A Full Dynamic Range Of A Color Map

The Applicants also respectfully submit that claims 21 and 22 are not rendered unpatentable by Yamazaki alone or in combination with Washburn at least for the

reasons discussed above. Additionally, the Applicants note that Yamazaki does not teach, nor suggest, a "color representation of said moving structure in response to said set of color characteristic signals" that "uses a **full dynamic range** of the color map, wherein said full dynamic range of the color map includes a continuous range of color hues from red to violet." A full dynamic range of a color map is the panoply of continuous colors over the spectrum represented by R-O-Y-G-B-I-V (Red-Orange-Yellow-Green-Blue-Indigo-Violet).

As noted above, Yamazaki only discloses representing contraction velocities as red or blue, which is not a "full dynamic range of the color map." Yamazaki does disclose displaying additional colors. For example, Yamazaki states the following:

> Hence, the velocity data processing unit 226 not only colors the calculated characteristic component such as mean velocity, but calculates a variation of the movement velocity vector for every section, colors it differently (e.g., with yellow or green) and displays these image data at the display unit 19 (cf. FIG. 94). Consequently, a radial section with a greater variation, for example is displayed with a mean velocity using red or blue having a color tone greater than that of yellow or green.

Id. at column 43, lines 11-19. Thus, mean velocity is displayed as either red or blue, while "variation of the movement velocity vector for every section," may be colored differently. In other words, Yamazaki discloses coloring a first characteristic (e.g., mean velocity) either red or blue, and a second color characteristic either yellow or green. Yamazaki, however, does not teach, nor suggest, a "color representation of said moving structure in response to said set of color characteristic signals" that "uses a full dynamic range of a color map" (such as the panoply of continuous colors over the R-O-Y-G-B-I-V spectrum). Instead, Yamazaki uses a first color set, e.g., red or blue, for a first

characteristic, and a second color set, e.g., yellow or green, for a second characteristic.

At least for this reason, the Applicants respectfully submit that claims 21 and 22 should

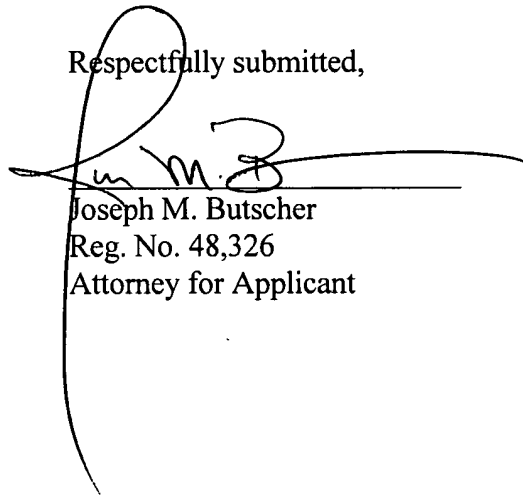be in condition for allowance.

IV. Conclusion

In light of the above, the Applicants request reconsideration of the rejection of the

pending claims and look forward to working with the Examiner to resolve any remaining

issues in the application. If the Examiner has any questions or the Applicants can be of

any assistance, the Examiner is invited to contact the Applicants. The Commissioner is

authorized to charge any necessary fees or credit any overpayment to Deposit Account

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